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ABSTRACT

The number of school age children with Attention Deficit Disorder (ADD) has increased over the past decade to 10-20% of the elementary school population and is expected to continue to grow. The need to understand these children and effectively teach them is obvious. This paper examines the research literature to determine the best and most current methods available for teaching mathematics to children with ADD. Suggestions include close communication between home and school and an active learning format that uses manipulatives. Reciprocal peer tutoring can also be effective. ADD students benefit most from highly structured activities and careful attention to meaning and understanding. (MKR)

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TEACHING MATHEMATICS TO ATTENTION DEFICIT DISORDER STUDENTS

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Abstract

"TEACHING MATHEMATICS TO
ATTENTION DEFICIT DISORDER STUDENTS"

The primary purpose of this study was to determine the best and most current methods available for teaching mathematics to children with Attention Deficit Disorder. Specifically this study was directed toward a review of the current research literature as a means of learning more about the behavior of children who have Attention Deficit Disorder and the most effective methods which may be available to teach them.

The number of school age children with Attention Deficit Disorder is estimated to be between ten and twenty percent of the elementary school population. This population has increased over the last decade and is expected to continue to grow. The need to understand these children and the ability to effectively teach them is obvious.

Attention Deficit Disorder has been a concern of the scientific community since the early 1900's. Today, considerable progress has been made in the criteria for diagnosis, treatment, and ways of teaching mathematics and other academic subjects to children with Attention Deficit Disorder.

Specifically the research literature suggested close communication between home and school and an activity learning format including manipulatives. Care should be taken to insure that they understand the meaning and importance of the lesson as it's being taught.

What is Attention Deficit Disorder?

Attention Deficit Disorder has been studied by several scientific disciplines involving pediatrics, neurology, psychiatry, psychology, and education. In the early part of the 20th Century, children who demonstrated many of the symptoms that are now incorporated as part of Attention Deficit Disorder were described by Dr. George E. Still as "morbid defects in moral control" (Epstein, Shaywitz, Shaywitz and Woolston, 1991). In the 1920's to 1950's, children with similar behaviors were thought to have suffered brain injuries resulting from birth trauma, measles, epilepsy, or a variety of other nervous system infections (Ecoff 1992). After World War I, soldiers who had suffered brain injuries showed signs of behavioral disturbances. These occurrences supported the theory that behavioral problems and brain damage are related.

In the 1950's Taufer and Denhoff studied hyperkinetic syndrome stating that it was an "injury to or dysfunction of the diencephalon" (Epstein and Other 1991). Their belief was that children suffered brain injury during birth. A study of children with behavioral problems revealed that their mothers had suffered more complications of pregnancy than had the mother of children without behavioral problems (Bain 1991).

In the 1960's Clements and Peters studied the notion of minimal brain dysfunction (MBD). Their study introduced the notion of special neurologic examination or examination for

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minor neurological abnormalities as indicators of organic brain damage (Epstein and Other 1991). While the medical community accepted minimal brain dysfunction, the educational community looked at these children as having learning disabilities. Over time, it became apparent that the concept of minimal brain dysfunction was flawed. With the combination of learning disability and behavior disorder within its diagnosis only compound the already existing confusion (Epstein 1991). In the 1970's emerged scientifically valid classification schemes with diagnostic criteria for effective disorder.

The most significant change occurred in the 1980's when the psychiatric community became involved. Awareness, diagnosis, and treatment of Attention Deficit Disorder became an important issue. The American Psychiatric Association developed DSM-II, a criteria for diagnosis of Attention Deficit Disorder, later revised to DSM-III. Attention Deficit Disorder was also classified as a learning disability available for special education under PL94-142 Latham and Latham 1992). The cause of Attention Deficit Disorder is unknown, but studies of the brain patterns of children with Attention Deficit Disorder are being conducted.

Identification of Children with Attention Deficit Disorder.

The identification of children suspected of having Attention Deficit Disorder should be a multistep, multidisciplinary process. First information about the child

should be collected from a number of different sources. Medical, mental, social, emotional development, parents and school. Parents and schools should use rating scales (Council for Exceptional Children 1992). The rating scale used most by parents and teachers is the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders.

a. A disturbance of at least six months during which at least eight of the following are present:

1. often fidgets with hands or feet or squirms in seat/in adolescents, may be limited to subjective feelings of restlessness.
2. has difficulty remaining seated when required to do so.
3. is easily distracted by extraneous stimuli.
4. has difficulty awaiting turn in games or group situations.
5. often blurts out answers to questions before they have been completed.
6. has difficulty following through on instructions from others/not due to oppositional behavior or failure of comprehension, e.g., fails to finish chores.
7. has difficulty sustaining attention in tasks or play activities.
8. often shifts from one uncompleted activity to another.
9. has difficulty playing quietly.
10. often talks excessively.
11. often interrupts or intrudes on others e.g., butts into other children's games.
12. often does not seem to listen to what is being said to him or her.
13. often loses things necessary for task or activities at school or at home (e.g., toys, pencils, books, assignments).
14. often engages in physically dangerous activities without considering possible consequences (not for the purpose of thrill seeking), e.g., runs into street without looking.

Note: The above items are listed in descending order of discrimination power based on data from a national field trial of the DSM-III-R criteria for Disruptive Behavior Disorders.

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b. Onset before the age of seven.
c. Does not meet the criteria for a Pervasive Developmental Disorder.

Criteria for severity of Attention Deficit Hyperactivity Disorder:

Mild:	Few, if any, symptoms in excess of those required to make the diagnosis and only minimal or no impairment in school and social functioning.
Moderate:	Symptoms or functional impairment intermediate between "mild" and "severe".
Severe:	Many symptoms in excess of those required to make the diagnosis and significant and pervasive impairment in functioning at home and school and with peers.

The American Psychiatric Association developed the DSM-III-R to emphasize the role of teachers and parents as the best source of diagnostic data. Recently, two other rating scales have been developed by DuPaul and Barkley for parents and teachers. The first, Home Situations Questionnaire asks parents to rate the severity of behavior problems in each of the 14 situations at home. The second School Situation Questionnaire asks teachers to rate the severity of behavior problems in each of eight school settings (DuPaul and Barkley 1992).

After a child has been diagnosed as meeting the criteria for Attention Deficit Disorder, further assessment should determine the degree to which the child's educational performance is effected. This will help determine what type of educational services are needed for the child (Council of Exceptional Children 1992).

A comprehensive study evaluating a number of possible indicators such as:

Sleeping and/or eating problems, mild motor incoordination, social difficulties, and family history of similar traits, should be completed before a child is labeled Attention Deficit Disorder (Pecant 1991).

Types of Attention Deficit Disorders.

The DSM-III rating scale provides categories for Attention Deficit Disorder with and without hyperactivity (Shaywitz and Shaywitz 1991) but it is unclear if they are two forms of a single disorder or two distinct disorders.

The distinction between learning disabilities and Attention Deficit Disorder were relatively clear when using DSM-III (Epstein and Others 1991).

With the introduction of DSM-III-R the distinction between Attention Deficit Disorder with and without hyperactivity became unclear. In DSM-III-R the focus is on hyperactivity. The American Psychiatric Association is in the process of developing new criteria for Attention Deficit Disorder. With the new criteria, the distinction between the two types of attention deficits will be clear as will the distinction between Attention Deficit Disorders and learning disabilities.

Under the DSM-III-R many children who have Attention Deficit Disorder without hyperactivity are not being identified for special services. This occurs most often with females because females with Attention Deficit Disorder do

not display hyperactivity. The number of females with Attention Deficit Disorder with hyperactivity is one female to about six males (Landau and McAninch 1993). Children who are labeled as Attention Deficit Disorder using the DSM-III-R are placed under one category Attention Deficit-Hyperactivity Disorder (Shaywitz & Shaywitz 1991).

Behaviors of Attention Deficit-Hyperactivity Disorder.

Students with Attention Deficit-Hyperactivity display signs of inattention, impulsive, inhibiting and over-activity (Bain 1991, Landau and McAninch 1993, McKinney, Montague and Hocutt 1993, Goldstein and Goldstein 1992). Inattention is the major difficulty associated with Attention Deficit Disorder. They lack the ability to block-out distractions and complete assigned task. Many find it difficult to listen to the teacher and taking notes. It is important to note that a highly structured setting creates the greatest problem for these students than a less structured setting, although some problems still exist in this setting (Landau and McAninch 1993).

Although children with Attention Deficit Disorder have problems with inattention, they are also impulsive and inhibiting. They do not think before they act. They do not consider the consequences of their actions. They are likely to cross the street without looking. They are known as fast but careless and inaccurate problem solvers (Landau and McAninch 1993).

The third primary symptom is overactivity. Overactivity involves the excess use of motor skills. Children have a hard time sitting still for long periods of time. These children may constantly be moving with such activities as: tapping their fingers, shaking their leg, and hums or makes other noises. During social play they are often overactive and incessantly talkative which seems to have a negative effect on peer relationships (Landau and McAninch 1993).

School and District Based Management of Attention Deficit Disorder.

The Federal Resource Center at the University of Kentucky reviewed over a hundred different programs for serving students with Attention Deficit Disorder. They found that no single plan submitted could meet the needs of every student because students vary in their needs (Burcham, Carlson, and Milich 1993). However, they developed several themes to determine if a program will be useful to students with Attention Deficit Disorder (Burcham and Others 1993). They are as follows:

1. Before implementing a program or practice, one should determine whether implementing a change in the educational design is likely to have a positive effect.
2. It is important to note if the strategy has practical value in the school or home situations.
3. Be able to be replicated at other sites with the expectations of similar results.
4. Acknowledge the benefits of early detection.
5. Address the three major components of the disorder (inattention, impulsive, and overactivity).
6. Focus on strengths as well as needs.
7. Shows evidence of collaborative involvement by

families and the community.

8. Be designed to consider skill acquisition of desired behavior or academic materials, as well as maintenance and generalization.

Teaching Attention Deficit Disorder Children using behavior therapy or management.

Attention Deficit children tend to cause disruptions to regular classroom procedures by taking the teachers away from other students with their disruptions. To help control the disruptions, the teacher needs to implement a behavior management program that meets the needs of their students.

One form of behavior management is the reward system. Most teachers feel that students should not be rewarded for using appropriate behavior. An Attention deficit child seldom engages in appropriate behavior (such as sitting quietly), in these cases rewards maybe necessary to promote the behavior (Landau and McAninch 1993). Later as the child learns, the behavior rewards can be gradually removed. Types of rewards may be verbal praise, material rewards, star chart, a special report sent to parents, and stickers on work.

Another method of controlling behavior is the use of negative feedback or reprimands. The use of negative feedback has proven to be effective in decreasing off-task behavior (Fiore, Backer, and Nero 1993). Response cost programs have shown to be more effective than negative feedback. Response cost is a combination of positive reinforcement and negative feedback (Fiore and Others 1993).

It has shown to be effective in improving attention, on-task behavior and completion of tasks.

One of the most effective methods of behavior managements are reports to parents. Parents help to reenforce effects make by teachers. Parents can reward children with special activities or other items that are important to the child.

Many times disruptive behavior is caused by the teacher. Teachers must give clear and brief directions (Landau and McAninch 1993). Teachers should avoid directions that are in the form of a question. Also avoid giving to many directions that the student will be unable to follow.

Methods of teaching mathematics to students with Attention Deficit Disorder.

Attention Deficit children do not benefit from the old method of the endless use of worksheets. These students need to be active learners. There are a variety of teaching methods that will allow these students to become active learners.

One method is the use of manipulative objects (Midkiff, 1991). There are more manipulatives available for math concepts than any other curriculum area. The use of manipulatives gives the child a physical object to learn a variety of math concepts. To an Attention Deficit child this helps to reduce the amount of distractions they might otherwise have when completing written assignments.

Another method is reciprocal peer tutoring. In this cooperative strategy students alternate between student and teacher roles and follow a structured format to help team members make academic progress (Fantuzzo, King and Heller 1992).

The National Council of Teachers of Mathematics has developed standards for teaching math. These standards require that the student becomes an active learner. By incorporating these standards into the classroom the learning problems of Attention Deficit Disorder children will decrease. The standards require students to conduct experiments, work in groups as well as work individually (Kirsner and Bethell 1992).

When incorporating these types of teaching methods into the classroom, keep in mind, Attention Deficit children move easier from formal to informal settings (Goldstein and Goldstein 1992).

Sullivan (1991) made several suggestions about homework assignments.

--the purpose of homework should be clear to all.
--assignments should be well planned and related to class lesson.
--teachers should determine whether they are grading students on "compliance" issue related to homework.
--if homework is given, remember to collect it, respond to it, and return it promptly.
--determine what should be done if a student is unable or unwilling to do the homework.
--do not assume parents are able/willing to help students with their homework.
--schools should establish written homework policies with the input of parents.

When dealing with Attention Deficit children remember

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that all students have different needs.

Conclusion

Attention Deficit Disorder is a problem that effects many school-age children. There has been many studies on how to best serve these students. Most reports show that Attention Deficit Children benefit from parent and teacher communication and active learning processes. The use of active learning maybe used in the form of individual use of manipulatives or group activities. An important point to remember when teaching Attention Deficit children is to give meaning to the lesson being taught.

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